CONTAINER FOR VACUUM-DEPOSITING MATERIAL

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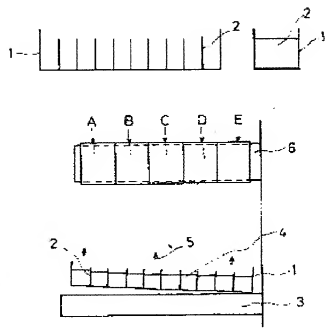
Abstract of **JP57123973**

PURPOSE:To uniformly evaporate a vacuum-depositing material from a long- sized container by dividing the container into a plurality of sections in the longitudinal direction. CONSTITUTION:A long-sized box-shaped container 1 made of stainless steel for holding a vacuum-depositing material is divided into 10 sections with partition walls 2 made of stainless steel. Selenium 4 is put in the container 1, evaporated by heating, and deposited on the surfaces of Al cylinders A-E attached onto a horizontally rotating upper shaft 6 close to each other. At this time, a temp. difference between the sections of the container 1 and a temp. difference between the surface of selenium 4 and the interior are reduced by heat conduction through the walls 2, unevenness in film thickness is reduced remarkably, and the evaporation speed is stabilized, resulting in almost uniform deposition time. In addition, the strength of the container 1 is increased by the walls 2.



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Specification

1. Title of the Invention: CONTAINER FOR VAPOR-DEPOSITION MARTERIAL

2. Scope of Claim

A long metal container for holding a vapor-deposition material used for vacuum vapor deposition, comprising partitions made of metal for dividing the container into a plurality of sections in the longitudinal direction.

3. Detailed Description of the Invention

The present invention relates to a long vapor-deposition material container used for vapor-depositing, for example, a photosensitive layer of an electrophotographic photosensitizer in vacuum.

In vacuum vapor deposition, it is desirable that a uniform vapor-deposited layer be produced on a base substrate as the vapor-deposition object. In particular, in the case of an electrophotographic photosensitizer that is formed as a photosensitive layer by vapor-depositing selenium or selenium alloy on a conductive base substrate, a photosensitive layer having a uniform thickness and uniform electrophotographic properties is required for obtaining a favorable image over the whole surface. The electrophotographic photosensitizer is formed by, for example, rotating an aluminum cylinder with a length of 300 mm or more and vapor-depositing selenium or selenium alloy that is evaporated from a long vapor-deposition material container with about the same length as the cylinder onto the surface. In this case, the vapor-deposition material might not be evaporated uniformly in the longitudinal direction depending on the tilt at which the vapor-deposition material container is set in an evaporation tank, transformation of the vapor-deposition material container due to handling or heating, variations in temperature of the vapor-deposition material container at the time of heating, and the like. Accordingly, it is difficult to form a uniform vapor-deposited layer on the whole surface of the cylinder.

In view of the foregoing, it is an object of the invention to provide a vapor-deposition material container for evaporating a vapor-deposition material at uniform evaporation speed from the whole surface.

This object can be achieved by providing partitions made of metal in a vapor-deposition material container in order to divide the container into a plurality of sections in the longitudinal direction.

Description is made below on an embodiment of the invention with reference to the

drawings. FIG. 1 and FIG. 2 show an example of a vapor-deposition material container in accordance with the invention, where a long box container 1 made of stainless steel with a width of 30 mm, depth of 30 mm and length of 1700 mm is divided into 10 sections by partitions 2 made of the same material. This container 1 is set on a support 3 in an evaporation tank at a tilt of 30° as shown exaggeratedly in FIG. 3, so that each section is gradually filled with selenium 4 of 100 g, and a total of 1000 g. Then, the vapor-deposition material is heated to 320°C in vacuum of 5×10^{-5} Torr or lower to be evaporated. Thus, vapor 5 is vapor-deposited onto the surface of five aluminum cylinders A, B, C, D and E that are closely attached to a horizontally rotating shaft 6 above the container 1. For comparison, vapor deposition was carried out under the same condition by using a conventional vapor-deposition material container 7 made of stainless steel shown in FIG. 4, which has the same dimension but has no partitions, and by filling the container with selenium of 1000 g. The thickness of a vapor-deposited film on each cylinder is as shown in Table 1.

Table 1

Thickness of Vapor-deposited Film (μm)					
Container \ Photosensitizer	A	B	C	D	E
No Partitions Provided	46	48	52	57	63
Partitions Provided	56	55	55	54	53

Next, vapor deposition was carried out several times under the same condition without tilting the container. Table 2 shows the measurement results of the time after a vapor-deposition material reaches 320°C until it is entirely evaporated.

Table 2

Vapor-deposition Material Container	Time Required (Time)
No Partitions Provided	10 to 14
Partitions Provided	9 to 11

As is evident from these results, variations in film thickness are significantly reduced in the case of using a vapor-deposition material container in accordance with the invention, and the

evaporation speed is stabilized to reduce variations in evaporation time. This is because heat conduction by the partitions serves to decrease the temperature difference between each part of the vapor-deposition material container and also decrease the difference between the surface temperature and internal temperature of the vapor-deposition material. In addition, the partitions can increase the strength of the container, making it less easily transformed. As a result, uniform vapor deposition can be maintained even when the container is repeatedly used.

As described heretofore, according to the invention, a vapor-deposition material container made of metal is divided into a plurality of sections in the longitudinal direction by partitions so that the temperature difference of materials between each section is decreased to perform uniform evaporation from the whole container surface. Accordingly, not only a uniform vapor-deposited film can be formed on a material as the vapor-deposition object, but also the container can be made less easily transformed, enabling the repeated use. Thus, it can be effectively applied to the manufacture of an electrophotographic photosensitizer that requires a uniform photosensitive layer on the whole surface, in particular. Note that the size of each section is not necessarily required to be identical to each other since the invention is based on the improvement of heat conduction or strength by using the partitions.

4. Brief Description of the Drawings

FIG. 1 is a front sectional view of one embodiment of a vapor-deposition material container in accordance with the invention; FIG. 2 is a side sectional view thereof; FIG. 3 is a front view showing a vapor-deposition experiment using it with a partial section; and FIG. 4 is a front sectional view of a prior art container used for comparison.

1: vapor-deposition material container; and 2: partition

Representative: Patent attorney, Iwao YAMAGUCHI

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⑤蒸着材料容器

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明　細　書

1. 発明の名称　蒸着材料容器

2. 特許請求の範囲

真空蒸着のために用いる長寸の蒸着材料収容用の金属製容器であつて、長手方向に複数の区画に仕切る金属製の仕切り壁を有することを特徴とする蒸着材料容器。

3. 発明の詳細な説明

本発明は例えば電子写真用感光体の感光層などの真空蒸着に用いる長寸の蒸着材料容器に関する。

真空蒸着においては被蒸着基体上に均一な蒸着層が生成されることが望ましい。特に導電性基体上にセレンあるいはセレン合金を蒸着して感光層とした電子写真用感光体の場合には、全面にわたつて良好な画像を得るために膜厚が等しく電子写真特性の均一な感光層が要求される。電子写真感光体は例えば長さ 300mm以上のアルミニウム円筒体を回転させその表面にほぼ同じ長さの長寸の蒸着材料容器から蒸発させたセレンまたはセレン合金を蒸着するが、この場合蒸着材料容器を蒸着槽へ設置する時の傾斜、取扱いあるいは加熱による蒸着材料容器の変形、加熱時の蒸着材料容器の温度のばらつきなどにより蒸着材料が長さ方向にわたつて均一に蒸発しなくなる。従つて円筒体の全面に均一な蒸着層を形成することが困難になる。

本発明はこれに対し全面から均一な蒸発速度で蒸着材料を蒸発する蒸着材料容器を提供することを目的とする。

この目的は長寸の蒸着材料容器が、長手方向に複数の区画に仕切る金属製の仕切り壁を有することによつて達成される。

以下図面を引用して本発明の実施例について説明する。第1図，第2図は本発明による蒸着材料容器の一例で、幅30mm、深さ30mm、長さ1700mmのステンレス鋼からなる長寸の箱形容器1は、同一材料の仕切り壁2によつて10の区画に区分されている。この容器1を第3図に誇張して示したように蒸着槽内の支持台3の上に約3°の傾斜をつけて設置し、各区画にセレン4を100gずつ、計1000gを充てんし、5×10^{-5}Torr以下

の真空中で蒸着材料を320°Cに加熱して蒸発させ、蒸気5を容器1の上方に水平に回転する軸6の上に互に密接して取付けられたそれぞれ長さ300mmの5本のアルミニウム円筒体A，B，C，D，Eの表面上に蒸着した。比較のために同一寸法で仕切り壁のない第4図に示す従来のステンレス鋼製蒸着材料容器7を用いて1000gのセレンを充てんし、同一条件にて蒸着した。各円筒体上の蒸着膜の厚さは第1表に示す通りである。

第　1　表

蒸着膜厚（μm）					
容器＼感光体	A	B	C	D	E
仕切り壁なし	46	48	52	57	63
仕切り壁あり	56	55	55	54	53

次に容器を傾斜させないで同一条件により数回蒸着を行い、蒸着材料が320°Cに達してから全部蒸発するまでの時間を測定した結果は第2表の通りである。

第　2　表

蒸着材料容器	所用時間（時間）
仕切り壁なし	10～14
仕切り壁あり	9～11

これらの結果から明らかなように、本発明による蒸着材料容器を用いた場合は膜厚のばらつきが著しく減少し、また蒸発速度が安定して蒸発時間のばらつきも減少する。これは仕切り壁による熱伝導により蒸着材料容器の各部の温度差ならびに蒸着材料の表面温度と内部温度の差が減少するためである。そのほかに仕切り壁によつて容器は強度が増大し、変形し難くなる。この結果容器を繰返し使用しても均一な蒸発を維持できる。

以上述べたように本発明は金属製蒸着材料容器を仕切り壁により長手方向に複数の区画に区分し、各区画内の材料の温度差を減少させて容器全面より均一に蒸発させるもので、これにより被蒸着材料上に均一な蒸着膜を形成できるばかりでなく、容器の変形も少ないので、繰返し使用に耐え、特に全面に均一な感光層が要求される電子写真用感光体の製造に有効に使用できる。なお、本発明は仕切り壁による熱の伝導あるいは強度の向上に基づくものであるから、各区画の大きさは必ずしも同一である必要はない。

4. 図面の簡単な説明

第1図は本発明による蒸着材料容器の一実施例の正面断面図、第2図は側断面図、第3図はそれを用いての蒸着実験を一部断面で示す正面図、第4図は比較のために実験に用いた従来例の容器の正面断面図である。

1：蒸着材料容器、2：仕切り壁。

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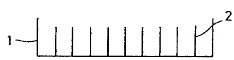
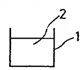
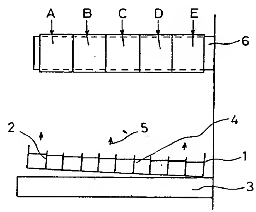
才1図



才2図



才3図



才4図